

HCAL analysis update

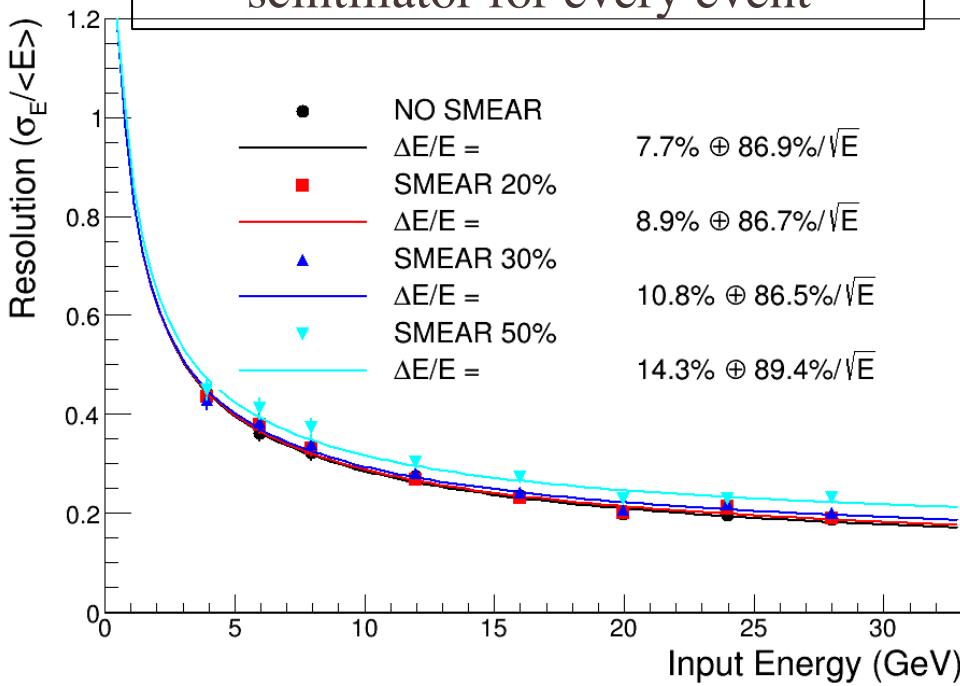
Abhisek Sen

SiPM gain flactuations

Gain fluctuations

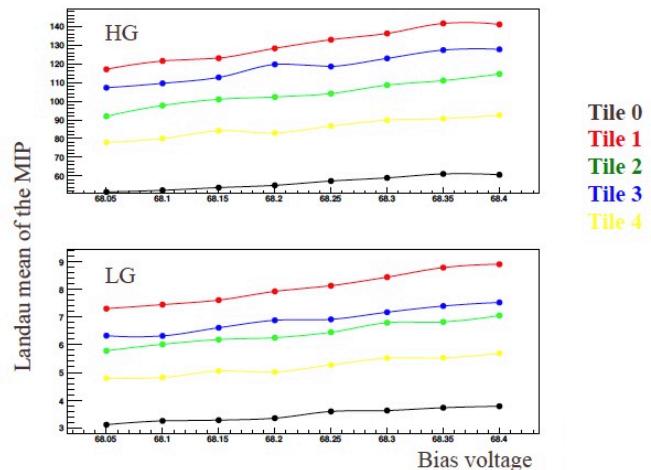
- +/- 1V voltage impact on the gains?

Smear energy collected from each scintillator for every event



From tile tests measurements more than year ago

Landau mean vs bias voltage



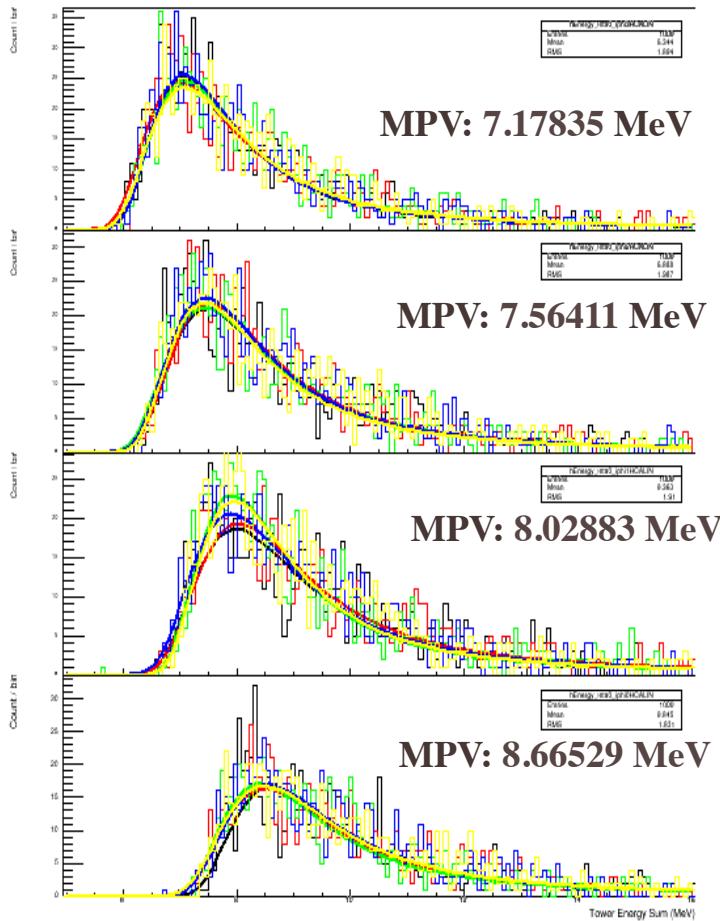
>40% change of MPV for +/- 1V

Gain variations will affect the overall resolution.

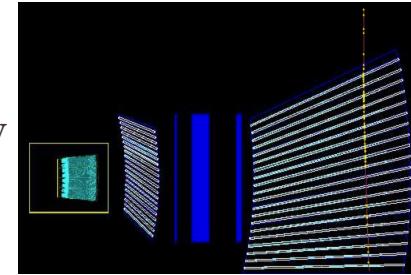
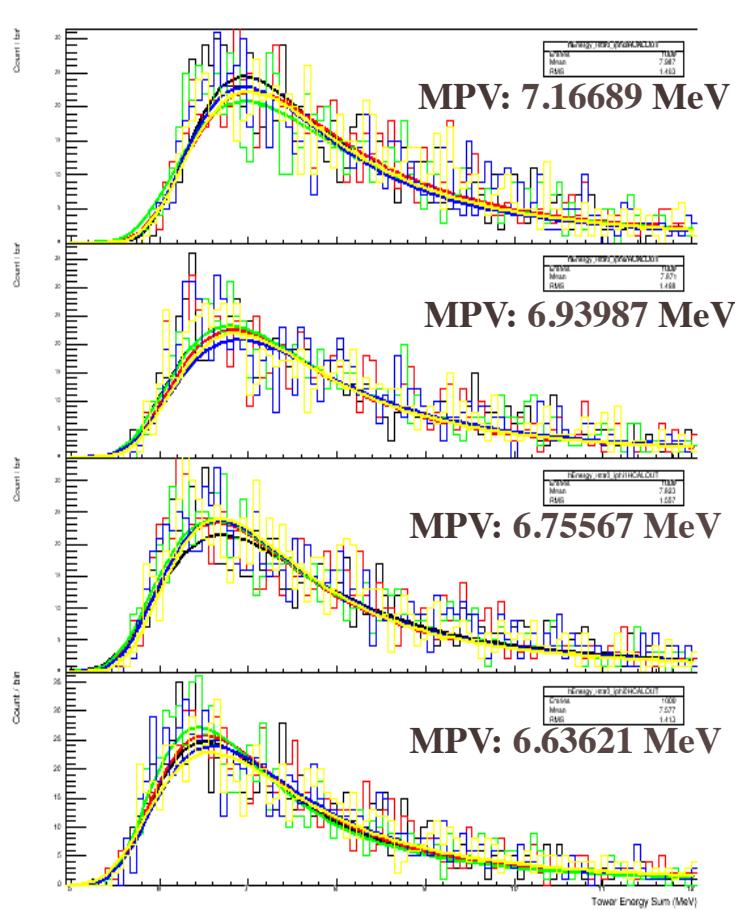
HCAL calibrations

Vertical cosmics simulation

Inner HCAL



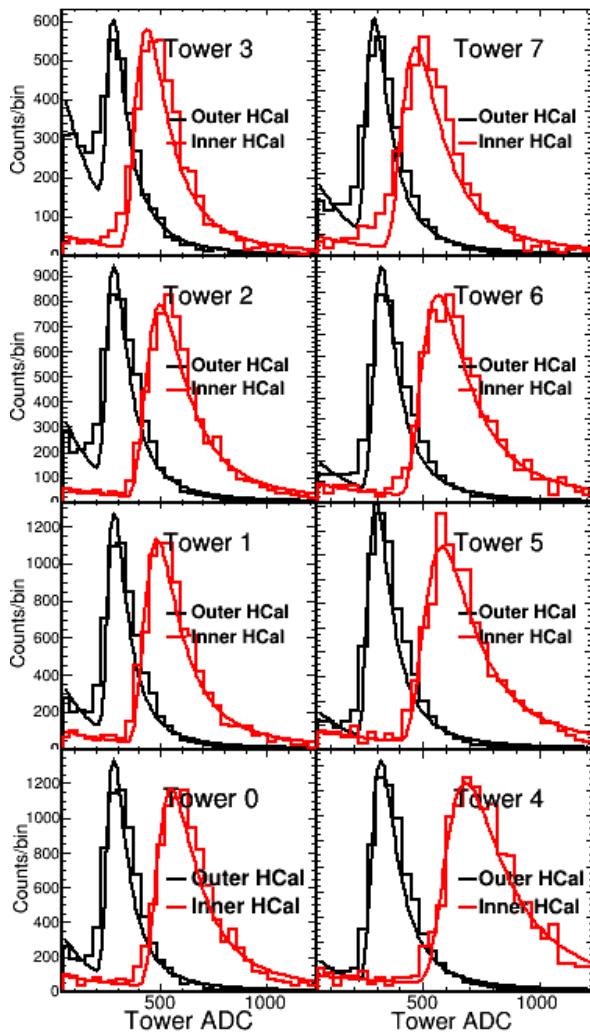
Outer HCAL



Energy deposition from 4 GeV vertical cosmics in 4 vertical towers.
Colors: 5 scans along the length of the tiles.

Light collection from the tiles

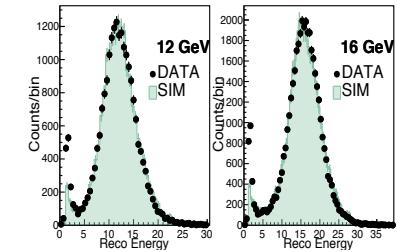
For 2 columns, HG



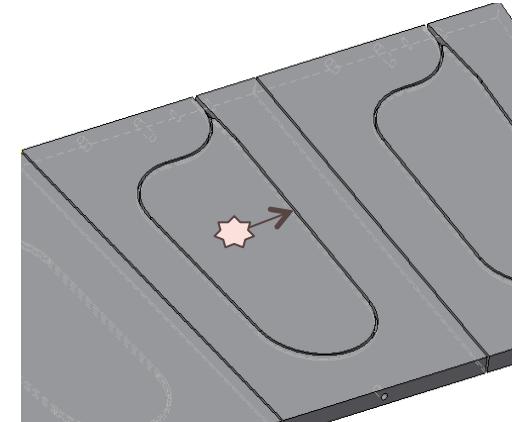
~2x light output in the inner HCAL

This was the source of the factor of 2 weight for inner while balancing inner with outer HCAL.

It has worked fine so far.

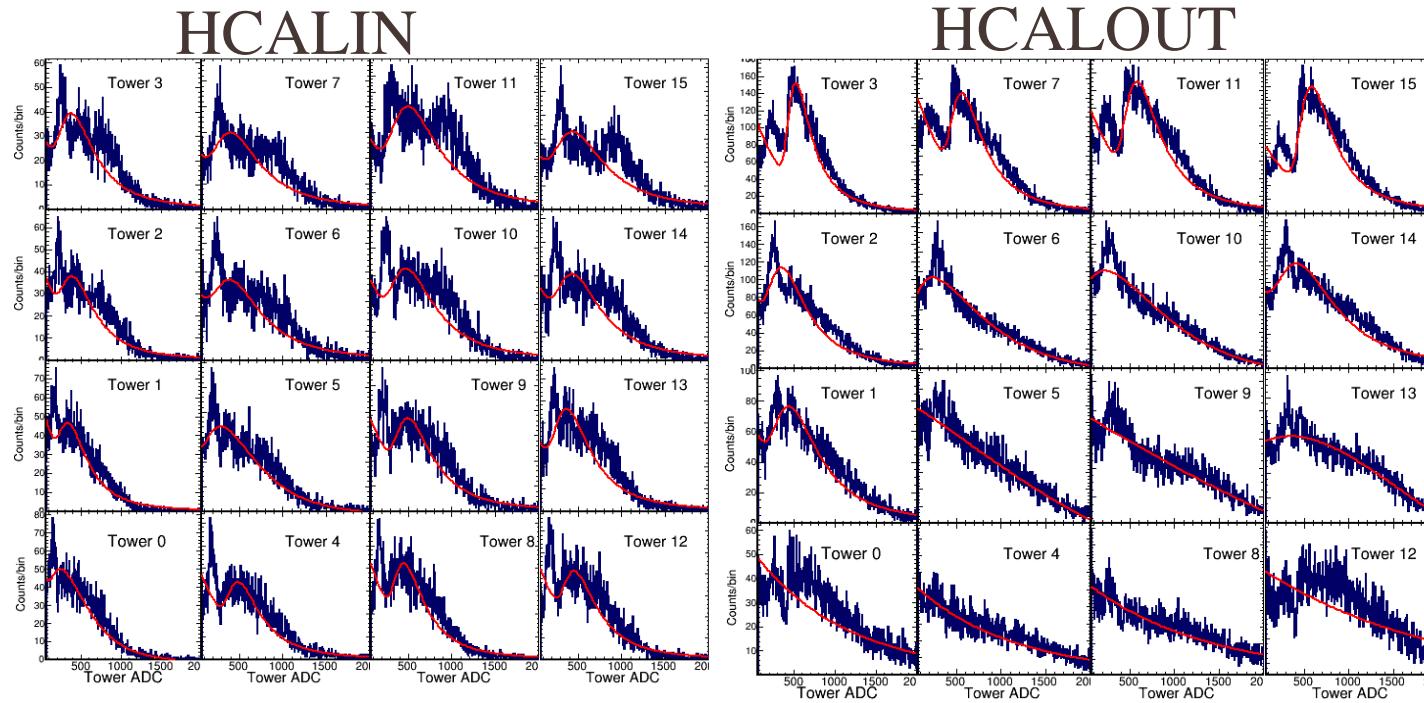


Should be a part of the calibration from now onwards.



Special run in last testbeam

- ❖ On JL's request collected some special run in FTBF muon mode.



Run 4014

No clear
Landau
peak.

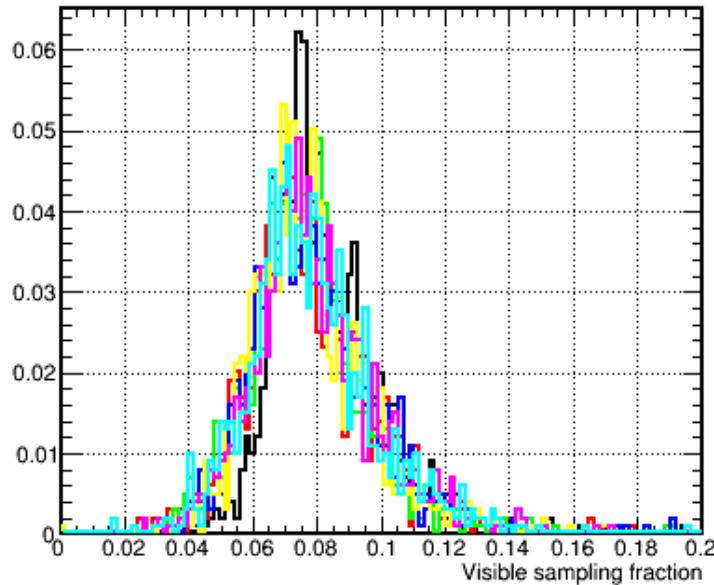
- For full detector, I think, a combination of self triggered cosmics + geometry cut should give good calibration.
- I have shown comparison with self-triggered vs vertical cosmics earlier, they are consistent.

HCAL simulations

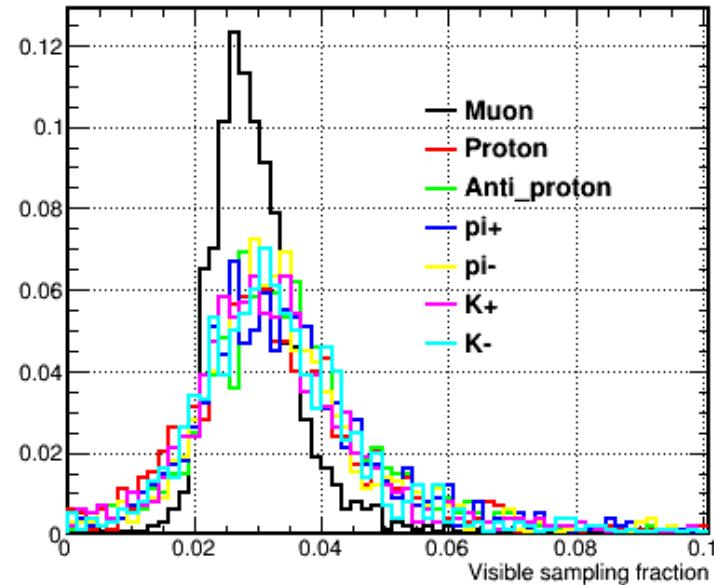
Prototype3 simulations

- ❖ Ran a bunch of simulation with prototype 3 setup.

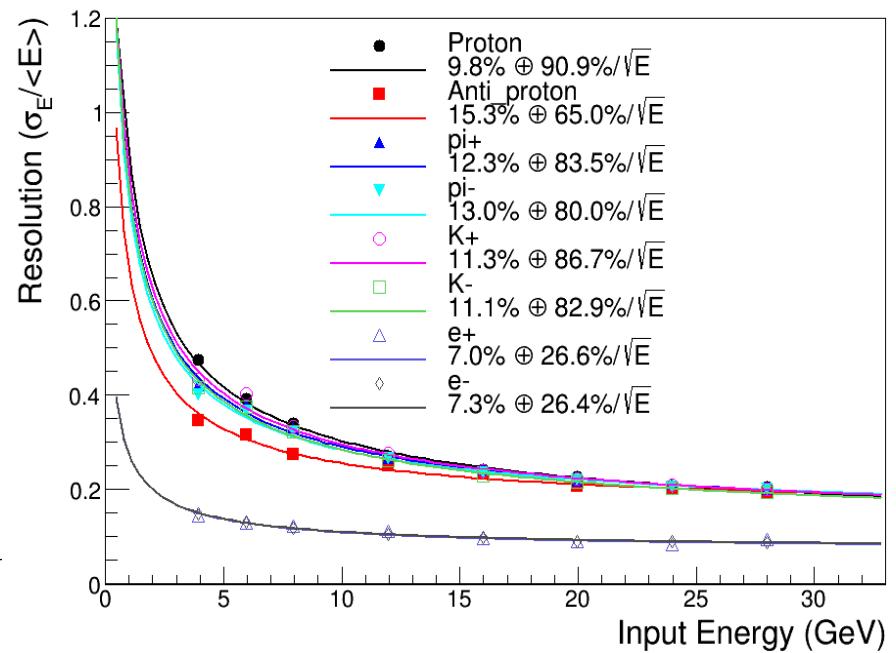
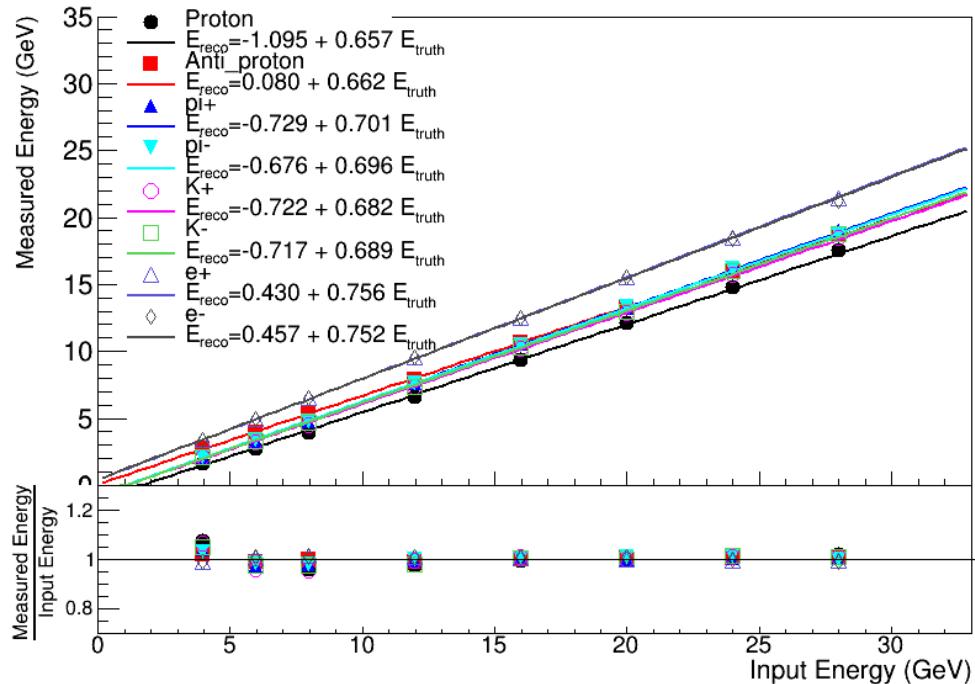
HCALIN visible sampling fraction



HCALOUT visible sampling fraction



Linearity and simulation



- HCAL only setup.
- Fixed sampling fractions from muons for all species.
- Protons and anti-protons behave quite differently.
- GSU group also running some simulation. Good to confirm this observations.